Valuing Groundwater Recharge.

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- Consumers place a high value on water supply reliability.
- Groundwater reserves improve reliability.
- Reliability benefits of groundwater should be included in its overall benefits.
- Socially beneficial recharge investments may not be financially viable for water agencies.

Twin Water Challenges: TMDLs and Water Supply Reliability.

LASGRWC aims to treat stormwater as a resource.

Los Angeles and San Gabriels Rivers Watershed Council
Water Augmentation Study

Treating stormwater as an asset

Purpose: to explore the potential for increasing local water supplies and reducing surface pollution by capturing stormwater runoff for infiltration and groundwater recharge

Research Questions

- Impact on groundwater quality and quantity
- Accessibility of recharged water
- Cost effectiveness.
- Other potential benefits: social, economic, environmental
- Potential for region-wide implementation

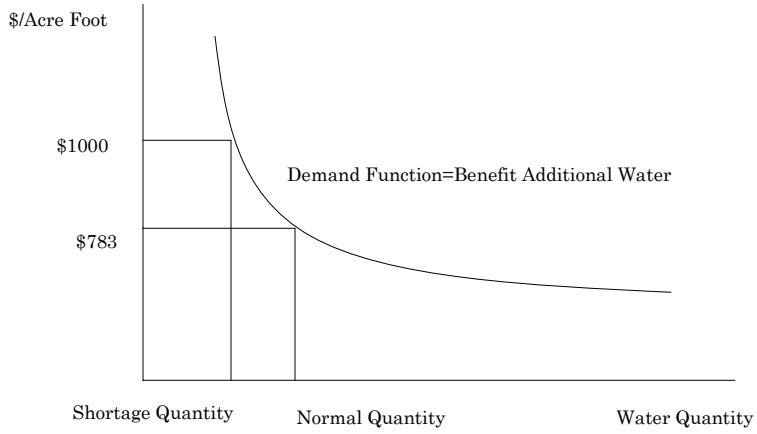
Agency Partners

City of Los Angeles Department of Water & Power
City of Los Angeles Watershed Protection Division
City of Santa Monica Environmental Programs
County of Los Angeles Department of Public Works
Metropolitan Water District of Southern California
Regional Water Quality Control Board, LA Region
TreePeople
University of California, Riverside
U. S. Bureau of Reclamation
Water Replenishment District of Southern California
State grants: Prop 13 SWRCB and CalFed

Water Storage Like a Savings Account.

Storage, like savings, is more valuable with more uncertainty.

There are Large Economics Benefits to Reliability.



Large benefit to consumers on avoiding water reductions.

Recharge Benefits not Costs.

Water Supply Benefits Only.

- Other Benefits are significant.
- But will vary project to project.

Benefit values for benefit-cost analysis.

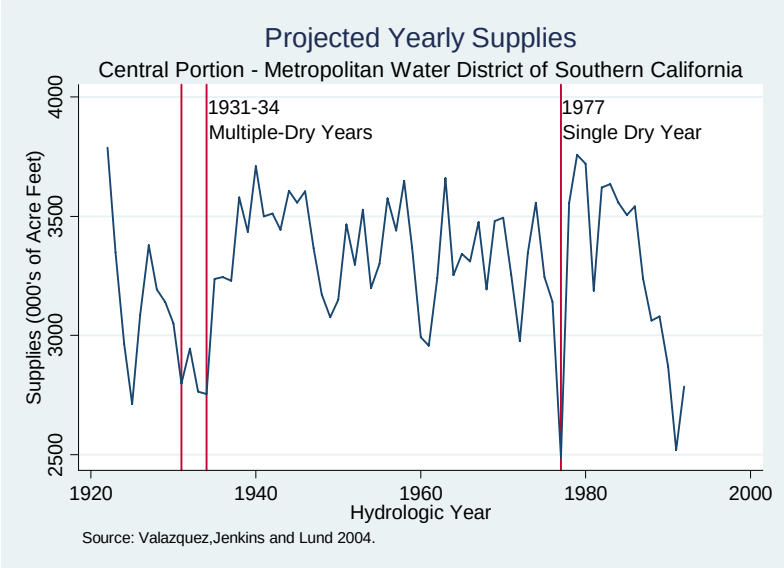
- Net out operational costs.
- Do not net out capital costs.

Consumers not Water Agencies.

- Water rates constrained by historical costs.
- Agencies don't derive revenue from increased reliability in general.

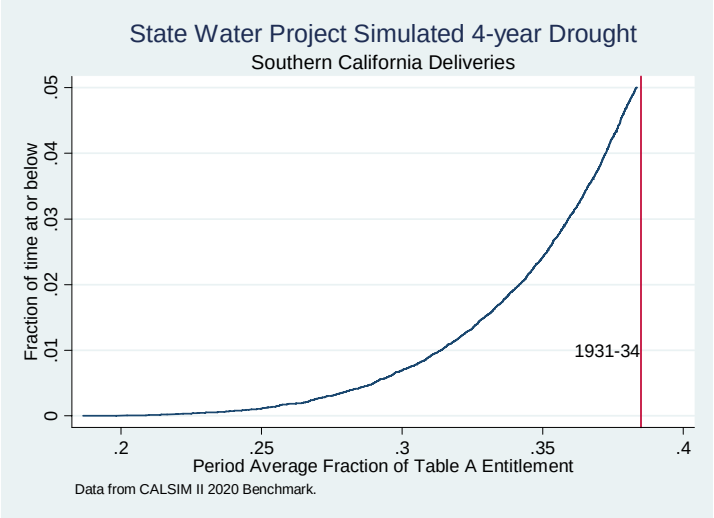
I estimate social benefits net of operational costs.

Drought Planning Looks at Historical Record.



But could we see worse than the historical record?

Worse than the Historical Record?



I.e. In 100 runs of a century of hydrology, 5 would have droughts worse than the hydrological record.

Estimating Groundwater Benefits Under Uncertainty.

Simulate Supplies.

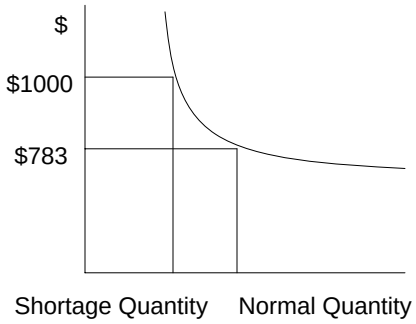
Optimize Groundwater Usage.

Determine existence and amount of economic shortfall.

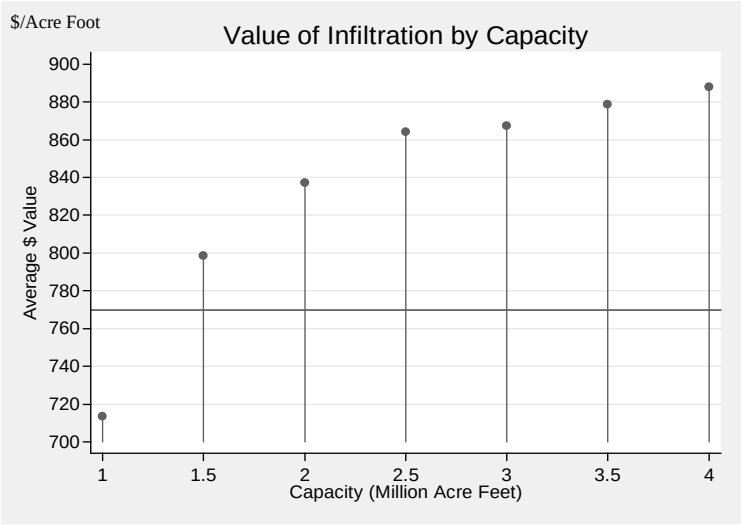
Additional Groundwater.

Re-optimize Groundwater Usage.

Determine benefit of avoiding any shortfall.



Estimated Benefits are Large



Increased capacity increases the benefits from recharge.

Caveats.

- No large new sources of supply.
  - Desalinization
  - New water deals.
- Projected 2020 facilities and operations.
  - New Storage.
- Limited analysis
  - Local groundwater only.

Significant new supply or storage would decrease recharge benefits.

Comparison to Replacement Approach

Replacement Approach

- MWD Tier 2 Rate ($549 per Acre Foot)
- pumping, treatment distribution costs ($233 per Acre Foot)

= $316 per Acre Foot Benefit.

Appropriate if:

- Recharge replaces other supplies at Tier 2 rate.
- No reliability advantage from groundwater.

Replacement cost close to water agencies financial calculation.

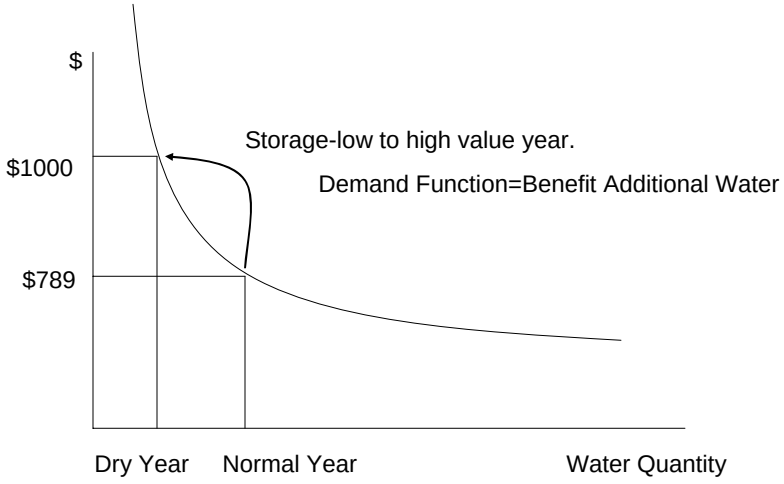
More Uncertainty On the Horizon.

- Climate Change.
  - Loss of snow pack storage.
  - Threats to Delta operations.
  - Climate uncertainty.
- Regulatory Stringency.
  - Increasing environmental demands.
  - Increasing water quality regulation.
- Emerging Pollutants.
  - The next perchlorate?

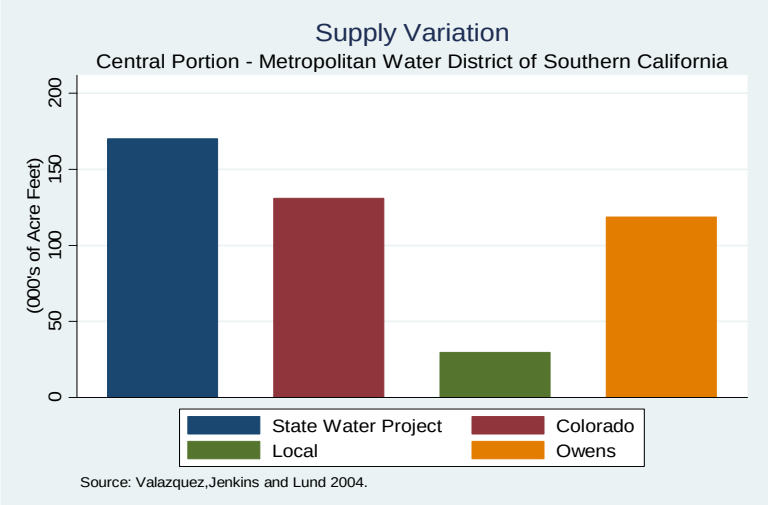
Conclusions

- Greater uncertainty increases the benefits of groundwater recharge.
- Current forecast practices do not fully take into account uncertainty.
- Uncertainty method estimates higher recharge benefit than replacement approach.
- Socially beneficial storage investments may not be financially viable for water agencies.

Storage Has Value Because it Smooths out Uncertain Flows.



Each Major Source Has its own Ups and Downs.



State Water Project supplies are the most variable.